NEW OR NOTEWORTHY NORTH AMERICAN USTILAGINALES

H. S. Jackson[1]

TILLETIACEAE

Tilletia Secalis (Corda) Kühn, Bot. Zeit. 34: 471. 1876

Uredo Secalis Corda, Oekon. Neuigk. und Verh. 1: 10. 1848.

While long known as of rare occurrence in central Europe, the bunt of rye has apparently not been reported in North America. Recently, in connection with a study of the smuts of New York state, the writer had occasion to examine a specimen from the Underwood herbarium at the New York Botanical Garden, which bears the following data: "Ustilago on Rye, Syracuse, N. Y., June, 1892, L. M. Underwood." This examination revealed the fact that the sori were confined to the grains and the spores were beautifully reticulated, suggesting those of *T. Tritici.* A comparison with European material (Vestergren, Micro. rario selecti *1474*) and with published descriptions suggested that the collection made by Underwood might properly be referred to *Tilletia Secalis.*

While resembling *T. Tritici,* and by some writers included with it[2] this species differs in certain characters. The sori are very much the shape of the normal rye grain but somewhat shorter and broader. The reticulations are 1.5–2.5 μ high and 3–4 μ wide, while in *T. Tritici* they are described as 1 high by 2–4 μ wide. The spores of *T. Secalis* averages slightly larger than in *T. Tritici.*

The New York collection consists of a single somewhat abnormal head. Some of the lower spikelets have developed long internodes so that the head appears much broader at the base than in the normal form. On account of this abnormal appearance and in order to make sure that no mistake in the identification

[1] Contribution from the Botanical Department of the Purdue University Agricultural Experiment Station.

[2] Cf. Schellenberg, Beiträge Krypt. Schweiz 3[2]: 90–94. 1911.

of the host had been made the specimen was submitted to Prof. A. S. Hitchcock and Mrs. Agnes Chase, who reported that the specimen was without doubt cultivated rye. Dr. C. H. Leighty, of the Office of Cereal Investigations, also examined the specimen and reported that there was no evidence that it could represent a rye-wheat hybrid.

On account of the importance of rye as a cereal crop in this country the existence of this old collection is considered worthy of note. While the validity of *T. Secalis* is questioned by some authorities, it seems best for the sake of emphasis to record the collection under the above name.

TILLETIA HOLCI (West.) Rostrup, Bot. Tids. 22: 256. 1899

Polycystis Holci Westend, Bull. Acad. Belg. II. 11: 651. 1861. *Tilletia Rauenhoffii* Fisch. de Waldh. Aperçu Syst. Ust. 50. 1877.

This very distinct species, long known in Europe, has not been reported for North America. It occurs on species of *Notholcus* and collections have been made by the writer in Oregon an *Notholcus lanatus* as follows:

Elk City, August 20, 1914, *1378*; Yaquina, July 17–20, 1915, *3017*.

The sori are obovoid, 1.5–2 mm. in length and occur in the ovaries nearly concealed by the glumes. The spores are chiefly globoid, 24–26 μ in diameter, occasionally ellipsoid, 24–26 by 26–30 μ, the wall cinnamon-brown, beautifully reticulated (measurements include the colorless reticulations which are 2.5–3 μ high). This smut was very abundant at Yaquina in 1915 and was collected in considerable quantity. All the ovaries in infected heads appear to be smutted.

ENTYLOMA COLLINSIAE Harkness, Bull. Cal. Acad. Sci. 1: 40. 1884

According to Clinton[3] this species is reported only on *Collinsia bartsiaefolia* from the type locality, Mt. Tamalpais, California. The following collections made by the writer in western Oregon, besides extending the range add two new hosts.

[3] N. Am. Flora 7: 63. 1906.

On *Collinsia grandiflora* Dougl. Mary's Peak, Benton Co., May 21, 1915, *3413*.

On *Collinsia tenella* (Pursh) Piper. Corvallis, Benton Co., April 8, 1914, *1696*, April 11, 1915, *3411*.

Urocystis Trillii sp. nov.

Sori hypophyllous on yellowish spots, subcostal, or caulicolous, round or oval, 0.5–1.5 mm. across, scattered or more commonly gregarious in more or less circular groups 5–10 mm. across, caulicolous sori often elongated, reaching 1 cm. in length, opening tardily and exposing the purple-black spore mass; ruptured epidermis cinereous and conspicuous; spore balls chestnut-brown, globoid, 24–50 μ, or ellipsoid, 30–40 by 50–70 μ, occasionally smaller; sterile cells subgloboid or polygonal, 5–9 μ, wall golden-brown, 1–1.5 μ thick, collapsing with age; spores subgloboid, ovoid or polyhedral, few to many in a ball, 3–20, rarely only one or two, mostly 10–15 μ, wall 2–3 μ thick, chestnut-brown.

On *Trillium chloropetalum* (Torr.) Howell. N. W. Corvallis, Benton Co., Oregon, April 13, 1912, F. D. Bailey, *1066*, May 19, 1912, F. D. Bailey, *1094*, April 7, 1914, *1811*, April 11, 1915, *3420*, May 1, 1915, *3408*, May 6, 1919, *3437* (type); Mary's River, Benton Co., June, 1911, *1097*.

Unless otherwise noted the collections were made by the writer.

This smut is very characteristic and conspicuous. The sori on the leaves are usually grouped together, the individual sori roundish or oval, usually 0.5–1.5 mm. across. On the veins and stems the sori are often confluent and quite large, reaching 1 cm. or more in length. With one exception the collections were made in one spot in low, rich land along a stream. The smut appeared in abundance each year.

UROCYSTIS ORNITHOGALI Koern.; Fisch. de Waldh. Aperçu Syst. Ust. 41. 1877

This species, occurring in Europe on *Ornithogalum*, has been more commonly referred to *U. Colchici* (Schlect.) Rab., but is considered distinct by Schellenberg[4] in his recent treatment of the smuts of Switzerland. The writer is inclined to agree with this

[4] Beiträge Krypt. Schweiz 3^2: 139. 1911.

view and to assign to *U. Ornithogali* collections on *Quamasia* made in Indiana and Oregon as follows:

Quamasia hyacinthina (Raf.) Britton. Lafayette, Tippecanoe Co., Indiana, May 30, 1907, F. Vasku; May 22, 1916, H. S. Jackson; May, 1917, G. N. Hoffer.

Quamasia quamash (Pursh) Coville. N. W. of Corvallis, Benton Co., Oregon, April 7, 1914, H. S. Jackson, *1969*; May 1, 1915, H. S. Jackson, *3409*.

According to this treatment, the smut on Liliaceous hosts belonging to the tribe Scilleae, including besides the American *Quamasia,* species of *Muscaria, Ornithogalum* and *Scilla* in Europe, would be assigned to *U. Ornithogali,* while *U. Colchici* would include the European form on *Colchicum autumnale.* The writer is not able to express an opinion as to whether the form on Convallariaceae in Europe and America is properly assigned to either of the above species, as sufficient material has not been available for study. Clinton[5] has assigned specimens on *Salamonia* and *Vagnera,* collected in Iowa and Montana, somewhat doubtfully to *U. Colchici.*

U. Ornithogali differs from *U. Colchici* chiefly in the widely different character of the sorus, the size of the spores, and the character and wall color of the surrounding layer of sterile cells. In the former the sori are elliptical, commonly half as broad as long, the spore balls consist usually of one, rarely two spores, which are 18–22 μ in diameter, and the sterile cells form a firmly united unbroken spore covering, the walls of which are cinnamon-brown. In the latter the sori are linear, often ten or more times as long as broad; the spore balls consist of one to two, rarely three spores, which are 14–20 μ in diameter; the sterile cells with light cinnamon-brown walls form a loose often interrupted layer over the spores.

TUBERCINA TRIENTALIS Berk. & Br. Ann. Mag. Nat. Hist. II. 5: 464. 1850

In North America this species has apparently been reported only from Alaska on *Trientalis arctica.* Three collections have

[5] Bost. Soc. Nat. Hist. Proc. 31: 452. 1904; N. Am. Flora 7: 57. 1906.

been made in Benton County, western Oregon, and are represented in the herbarium of the Oregon Agricultural College and that of the writer. All were made on *Trientalis latifolia* as follows: Philomath, April 20, 1912, H. S. Jackson and F. D. Bailey, *1093*; Corvallis, May 19, 1912, F. D. Bailey, *1098*, April 8, 1914, H. S. Jackson and F. D. Bailey, *1695*.

All three collections are ample and show both the conidial and chlamadospore stages. In our specimens the chlamadospore sori are confined to the stems and petioles. The conidial stage usually covers the entire upper surface of the leaf, though occasionally occurring in isolated pustular patches.

USTILAGINACEAE

Cintractia minor (Clinton) comb. nov.

Cintractia axicola minor Clinton, Jour. Myc. 8: 143. 1902.

The writer is of the opinion that this *Cintractia* is deserving of specific rank. It not only shows constant morphological differences from *Cintractia axicola* (Berk.) Cornu but occurs on a different host genus. Seven collections have been examined and the characters found to be constant. All are on *Cyperus Grayii* Torr. The first collections of which we have any knowledge were made at Atlantic City, New Jersey, Sept., 1884, by E. W. D. Holway, and Sept. 8, 1884, by J. C. Arthur. A collection was made by J. J. Davis at Sandy Hook, N. J., Aug., 1887, and by J. L. Zabriskie, Aug. 15, 1887. J. B. Halsted also found it at Sandy Hook, N. J., Aug. 15, 1889, and his collection was distributed in Ellis & Everhart's North American Fungi as no. *2423* (type of *C. axicola minor* Clinton). J. C. Arthur made a collection at Rockaway Beach, Long Island, Aug. 14, 1887. The writer also collected this species Oct. 4, 1907, at Selbyville, Delaware.

In this connection it is worthy of note that a typographical error has been made in the citation of Sandy Hook, New York, as the type locality. The printed label on the specimens distributed in Ellis & Everhart's North American Fungi *2423* does give Sandy Hook, "New York," as the place of collection. This is, however, obviously an error for New Jersey as is shown by

the data on the original specimen in the Ellis collection at the New York Botanical Garden, which was evidently communicated to Mr. Ellis by Dr. Halsted. The distribution by states as now known to the writer is New York, New Jersey and Delaware.

This species under discussion is easily separated from *Cintractia axicola* by the smaller spores, which measure 10–13 μ, while in *C. axicola* the spores are 12–18 μ. The effect upon the host is similar.

SOROSPORIUM SAPONARIAE Rud. Linnea 4: 116. 1829

This is the type species of the genus and has been reported from North America, so far as can be learned, only from Utah, on *Stellaria Curtisii* Rydb. and *Silene Menziesii* Hooker, by Garrett,[6] and from New York on *Cerastium arvense* by Peck.[7] The writer has recently examined specimens as follows, adding three new hosts for North America and extending the distribution to include Nevada and Colorado:

On *Cerastium oreophilum* Greene, Golden, Colorado, May, 1914, E. Bethel.

On *Silene Watsoni* Robinson, near Mt. Rose, Nevada, July 21, 1918, N. F. Petersen, *362*.

On *Stellaria Jamesiana* Torr., Golden, Colorado, June 12, 1905, E. Bethel.

Thecaphora Iresine (Elliott) comb. nov.

Tolyposporium Iresine J. A. Elliott, Mycologia 11: 88. 1919.

In the fall of 1918 Mr. C. C. Deam, of Bluffton, Indiana, sent to the writer, among other parasitic fungi, an interesting smut on *Iresine paniculata* (L.) Kuntze, which he had collected Sept. 21, 1918, in a dried up wooded slough about one half mile south of Half Moon Pond, which is about ten miles southwest of Mount Vernon in Posey County, Indiana. (Deam, no. 26651.)

This was at once recognized as a species of *Thecaphora* and an examination of the literature revealed that only one species of this genus was known in North America on Amaranthaceae,

[6] Garrett, A. O., Mycologia 2: 226. 1910; 6: 240. 1914.
[7] Peck, C. H., Bull. N. Y. State Museum 131: 27. 1909.

namely, *Thecaphora Thornberi* Griffiths.[8] The specimen on Iresine, while agreeing in general with the description of that species, seemed to differ in important characters. A definite decision with reference to the relation of the two forms was therefore reserved till the type of *T. Thornberi* could be examined. Through the kindness of Dr. Griffiths two collection of his species, one of which was the type, were furnished for study.

The *Iresine* smut is evidently very closely related to *T. Thornberi* but differs in several important respects. The sori, while involving the ovaries, are not usually confined to them, as described for *T. Thornberi,* but are indefinite, involving the ovaries and the perianth of single flowers or groups of flowers and also occasionally the rachis. The spore balls are much smaller in the species under discussion, measuring 40–75 μ in globoid balls, reaching 90 μ in occasional ellipsoid balls, while in *T. Thornberi* the globoid balls are 80–115 μ in diameter, reaching 145 μ in the ellipsoid ones. The spores are somewhat larger and the markings more prominent than in *T. Tornberi.*

The followng description was drawn up as a result of this study:

Sori localized in the inflorescence, involving the ovaries and perianth of one or a group of flowers, often involving the rachis, forming irregular galls 0.3–3.5 cm. long, enclosed by a firm grayish-green membrane, which ruptures irregularly, exposing the reddish-brown spore mass; spore balls solid, subsphaeroid, 40–75 μ, or ellipsoid, 50–70 by 60–90 μ, light chestnut-brown, composed of many, 15–70, spores; spores variable in shape, irregularly polyhedral, prismatic or oblong, 12–20 by 25–32 μ; inner wall thin, 1–1.5 μ, colorless or pale cinnamon-brown, smooth; exposed wall 2–4 μ thick, darker in color with prominent verrucose-rugose markings.

After this study was finished, but before the present paper was completed, the species was described as *Tolyposporium Iresine* from the same collection (Deam, 26651) by Dr. J. A. Elliott (l. c.). The species, however, obviously belongs to *Thecaphora* rather than *Tolyposporium* and this transfer is therefore made above. The author evidently failed to take into account the

[8] Bull. Torrey Club 31: 88. 1904.

existence of the very closely related *T. Thornberi.* Our description is somewhat at variance with the one previously published. The sori in our part of the type collection, which is fairly ample, are not confined to the ovaries and the spore balls do not appear to be hollow, nor do we find any evidence that the cells of the spore balls adhere "by folds of their outer . . . membrane."

TOLYPOSPORIUM JUNCI (Schroet.) Woron. Abh. Senck. Nat. Ges. **12**: 577. 1881.

Sorosporium Junci Schroet. Abh. Schl. Ges. Vat. Cult. **1869–1872**: 6. 1872.

This species is the type of the genus and occurs rather rarely in various parts of Europe, but has evidently not been reported from North America. The writer has made two collections in Oregon, both on *Juncus bufonius* L., one at Corvallis, Benton Co., July, 1910, and the other at Garden City, Multnomah Co., Aug., 1909, *1807*. The fungus is described as attacking the ovaries the stalks and also occurs at the base of the plant. In our specimens the infection occurs most commonly at the nodes, affecting the host somewhat similarly to *Cintractia axicola* on *Fimbristylis,* though often occurring at the base of the stalks. The spore mass is black, composed of spore balls of variable size and shape, 10–50 μ or more and composed of few to many rather small, irregular spores, 7–14 by 10–18 μ. The exposed spore wall is chestnut-brown and minutely verrucose.

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